

Water Quality Assessment
Forest-Wide Invasive Plant Treatment Project
Environmental Assessment

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1 Overview

Water Resources Law and Policy

Federal and state laws, policies and regulations that control the use of herbicides on NFS lands include the Clean Water Act, The Safe Drinking Water Act and the Federal Water Pollution Control Act.

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy for the control of point and non-point pollution, and assigns the states the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in California is achieved under state law (below).

Non-point source pollution on national forests is managed through the Regional Water Quality Management Handbook (USDA 2011b), which relies on implementation of 35 prescribed regional Best Management Practices (BMPs), as well as 23 national BMPs (USDA 2012) relevant to this project. Appendix B in the Watershed Report lists the relevant BMPs and their associated management requirements.

The California Water Code consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the national forests and are directed at protecting the beneficial uses of water. Of particular relevance for the Proposed Action is section 13369, which deals with non-point-source pollution and best management practices.

Section 208 of the 1972 amendments to the Water Pollution Control Act (Public Law 92-500) specifically mandated identification and control of non-point source pollution.

The Safe Drinking Water Act and its 1996 amendments require states to delineate public water sources, to determine potential sources of contamination, and to determine the most susceptible areas at risk for contamination.

The regulatory framework of the Inyo National Forest is guided by Federal laws and regulations as well as direction from the Forest Plan. Forest Plan direction is found in the Inyo National Forest LRMP (1998) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) of 2004. Management direction for water quality focuses on maintaining water quality and the restoration and maintenance of the physical, chemical, and biological integrity of the Forests waters.

To help restore and maintain these aspects of water-related resources, riparian conservation objectives (RCOs) were developed to provide specific management direction.

2 Basis for Analysis & Assumptions

2.1 Risk Factors

Water quality risk factors are identified by assessing three potential contaminant pathways:

1. Herbicides directly entering water bodies (including groundwater) by heavy storm runoff, accidental spill and fugitive drift from spray application.
2. Localized erosion and transport of soil to water bodies due to loss of vegetation cover.
3. Leaching of herbicides through specific soil types (soil types are identified in the Soils Section).

Analysis of risk factor #1 occurs in this report. Analysis of water quality risk factors #2 & #3 occurs in the soils report.

Risk assessments and monitoring studies of herbicide use in forested areas were used to substantiate design features that protect water bodies from potential adverse effects of the proposed treatments. Design Features (1-12, 32-37, Table 3) are outlined in Section 2.1.8 of the EA.

2.2 SERA Risk Assessments

SERA Risk assessments consider worst-case scenarios, including accidental exposures and applications at maximum allowable rates. They are considered by the Forest Service to represent the best science available. This method of assessing risk to water quality is considered conservative because actual conditions are less conducive to herbicides reaching water bodies. The infestations are scattered, streams are buffered from herbicide application and broadcast applications are much less typical than direct foliar or hand applications. All herbicides proposed by this EA have SERA risk assessments.

EPA risk assessments are performed on all herbicides prior to their sale, distribution or use in the United States. EPA labels are placed on all herbicide containers which include proper use related to protection of water quality. This analysis assumes that the EPA label instructions will be strictly followed (as required by law) for all herbicides proposed in this action.

2.3 Monitoring Studies

Monitoring studies were also used as a source of best available science, particularly Berg's (2004) compilation of monitoring studies on California forests. Berg (2004) found that any treatment buffer helps lower the concentration of herbicide in streams adjacent to treatment areas. In California, buffers between 25 and 200 feet generally had no detectable concentrations of herbicide in monitored streams. Buffers for herbicides proposed in this EA are designed to be protective of the most sensitive aquatic species and are therefore conservative with regard to water quality.

Berg (2004) reported that herbicide applied in or along dry ephemeral or intermittent stream channels may enter streams through runoff if a large rainstorm occurred soon after treatment. This risk is minimized if intermittent and ephemeral channels are buffered. If a large rainstorm occurs after herbicide application, sediment contaminated by herbicide could be carried into streams. Design Feature (#5) states that herbicide applications will be carefully evaluated following precipitation and/or when runoff, soil saturation, standing water, or heavy dew is present or expected, to ensure the application will not result in herbicides entering surface or groundwater. Application will occur only under favorable weather conditions, generally defined as: 30% or less chance of precipitation on the day

of application based upon NOAA weather forecasting, rain does not appear likely at the time of application, and if rain is predicted within 48 hours, the amount does not exceed a ¼ inch.

Water quality monitoring occurred from 1991 to 1999 to look at effects on multiple herbicide projects on National Forests in California (USDA Forest Service 2001). Glyphosate was used in four Forests on eight projects. With buffers as small as 10 feet, Glyphosate was found to be non-detectable in collected samples. Triclopyr was used on five projects on three Forests. Where Triclopyr was used with buffers of 10-15 feet, there were three projects where detections occurred. The levels of detection ranged between 0.1 to 1 ppb. One detection of 82 ppb was determined to be from not establishing a buffer on an ephemeral channel. The other detection was on a project with buffers of 10 feet; it had detection during winter storms of 0.63 ppm (parts per million) and 0.6-0.7 ppm. Another project with buffers of 15 feet had a single detection of 1 ppb (Berg 2001). These projects contained aerial or broadcast spray for conifer release with narrower buffers than processed in this project. Buffers for herbicides and restrictions on herbicide application prior to forecasted precipitation included in this action are designed to be protective of the most sensitive aquatic species and are therefore very conservative with regard to water quality. Design Features (1-12, 32-37, Table 3) are outlined in Section 2.1.8 of the EA.

3 Affected Environment

3.1 Water Quality

Water quality on the Inyo National Forest is generally good, due to low population and levels of development. Naturally flowing lakes and streams in the area generally have low nutrient, mineral and sediment levels. Geothermal springs have been found to have naturally high levels of some constituents, such as phosphorous, heavy metals and arsenic (Melack and Lesack, 1982 and Ebasco Environmental, et al. 1993).

The Forest currently has three (3) waterbodies on the State water board's 303(d) list of impaired waterbodies: Hilton Creek, Mammoth Creek and Rock Creek. None of these waterbodies are listed due to pesticides/herbicides (LRWQCB accessed on the Web on December 3, 2018).

Some developed areas on the Forest are known to have water quality degradation, though these areas make up a small portion of the waters on the Forest.

3.2 Municipal Water Supply

Municipal supply watersheds serve as public water systems as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in State safe drinking water regulations. There are several domestic water users scattered throughout or downstream from NFS land on numerous streams. While developing the design standards for the Proposed Action and the No Action alternatives the following water quality characteristics were considered:

- Distance to high water mark of streams, lakes, ponds, springs and meadows from the application of herbicides

- Mobility of herbicides considering the method of application within 25 feet of high water mark of streams, lakes, ponds, springs and meadows.

3.3 Hydrologic Cycle in the Analysis Area

The Mono Lake and Owens River watersheds receive most of their flow from streams originating in the Sierra Nevada. The White Mountains have very few streams on their west side, with only two streams, Silver Creek and Coldwater Canyon Creek, having perennial flow to the valley floor (Drew et al. 2011). While most of these streams are diverted upstream of the valley floor, they likely would have infiltrated into the alluvial fan before reaching any other water body even pre-diversion, due to the highly permeable alluvial fan soils and low average stream flows. The east side of the White Mountains has about seven perennial streams that extend beyond the Forest boundary, though they all infiltrate into their alluvial fan before reaching any other water body. The Inyo Mountains, in the southeastern portion of the Forest, have no persistent perennial streams on the east or west sides, but do have some perennial springs that create short perennial stream channels.

3.4 Stream Flows and Timing of Flows

Most surface water on the Forest is fed primarily by snowmelt. On average, surface runoff peaks in May during maximum snowmelt, and decreases through the fall, rising again in April when snow begins to melt. Although most annual peaks flows occur during May or June, the largest floods on record occur during winter, when warm winter storms cause rain on snow events. In many smaller tributary channels in drier portions of the Forest such as the White Mountains and the southern portion, the largest floods occur during intense summer thunderstorms. These thunderstorm-induced floods tend to be localized, due to intense local rainfall under a thunderstorm cell.

Many springs flow almost constantly throughout the year, though flows can vary from year-to-year. Therefore, some spring-fed channels do not have as much variation in flows as snowmelt-fed channels. Some streams, such as ephemeral streams in the arid portions of the Forest in the White and Inyo Mountains, may only have flow once every few years, or decade, and that flow is likely to be a flash flood due to intense thunderstorms. All of the watersheds' hydrology is snowmelt-dominated, though the influence of snow decreases southward and eastward. Most of the precipitation falls as snow between November and April, although rainstorms combined with rapid snow melt account for the largest floods. In some years, summertime monsoon storms from the Great Basin bring intense rainfall, especially to high elevations on the in the Whites and Inyo Mountains, and to a lesser degree in the Sierra Nevada.

4 Environmental Consequences

BMPs, designed to protect water quality, shall be implemented and maintained during project activities as outlined in the design features and in accordance with referenced Forest Service guidance documents. This project will also be included in the pool of forest projects for random selection and evaluation under National Core BMP Evaluation Program.

4.1 Alternative 1 - Proposed Action

4.1.1 Direct and Indirect Effects

Potential water quality impacts are assessed based on the probable or reasonably expected concentrations that might be encountered in water following herbicide application. Potential herbicide impacts include: 1) Herbicides directly entering water bodies by heavy storm runoff; 2) Fugitive drift from spray applications; 3) Localized erosion and transport of soil to water bodies due to loss of vegetation cover; and 4) Leaching of herbicides through specific soil types. These potential impacts are compared to State Water Quality Objectives and Federal Objectives.

Applicable objectives in the Central Valley Water Board Basin (2018) Plan include:

1. No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses.
2. Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses.
3. Pesticide concentrations shall not exceed those allowable by applicable anti-degradation policies.
4. Pesticide concentrations shall not exceed the lowest levels technically and economically achievable.
5. Waters designated for domestic or municipal supplies shall not contain concentrations of pesticides in excess of the Maximum Contaminant Levels (MCL) set forth in California Code of Regulations, Title 22 Division 4 Chapter 15.

The Lahontan Water Quality Basin plan states that, “the discharge of pesticides to surface or ground waters is prohibited”, (LRWQCB Basin Plan 1995).

The implementation of BMPs (EA Appendix C), design features, using the Annual Implementation Process will prevent herbicides reaching live water through drift, runoff, or groundwater movement. There will be no effect to water quality from herbicides entering water. The routes for herbicides to contaminate water could be direct application, drift into water bodies from spraying, and runoff from a large rainstorm soon after application. This section addresses each of these delivery routes.

The primary chemical treatment methods used would be hand application or directed spray of herbicides to the target plants. Drift would be minimal under these circumstances due to application of design criteria to minimize spray drift (DF 1-4). Design feature #32 creates treatment buffers for any type of spraying, and in combination with other design criteria, eliminate risk for herbicide contamination in surface water from drift.

Chemicals can be transported through soil via subsurface or groundwater flow and have the potential to reach surface water bodies. Dispersal of groundwater through soil would increase chances of herbicide chemicals adsorbing into soil. The implementation of BMPs and design criteria minimize the chance of herbicides reaching live water through groundwater movement. Given the rate, are to be treated, frequency, and method of application, degradation and dilution, and the implementation of design

criteria, the risk of groundwater contamination from the use of herbicides in this project is extremely low.

See Table 3 in the Draft EA for more information on buffers on perennial water bodies including buffers for intermittent and dry wash/ephemeral channels.

Table 1 displays the number of acres of treatment known to be needed for high priority treatment near water. Only two, Bouncing Bet and tamarisk are proposed for over an acre of treatment within 25 feet of live water.

Table 1. Acres of treatment of two high priority weed species within 25 feet of live water

Species	# of infestations	acres	treatment	Location
Bouncing bet	7	4	Direct foliar	Mill Creek and Lee Vining Creek
tamarisk	33	32	Cut-stump	Haiwee Creek, Inyo Moutains, Rush Creek, Hot Creek, Paiute Canyon, Oak Creek, Mill Creek

There are approximately 36 acres proposed for treatment. Of these, 32 acres are proposed for cut-stump treatment which dabs herbicide on the cut plant. An extremely small amount of herbicide is used for this treatment. The project design, stream buffers and implementation of BMP's will minimize the chances that any herbicide enters surface water.

Herbicides would be used within RCAs. Buffers on perennial streams and other water features are meant to protect water quality. In addition to the buffers, Design features 1-10 and 32-36 are meant to protect water quality. These buffers are considered adequate to minimize herbicide concentrations in water, because they are designed to be protective of the most sensitive aquatic species and other beneficial uses.

Project design features also minimize the chance of herbicides reaching streams or wetlands through fugitive drift and heavy storm runoff (See Table 3 and Design Features 1-10 and 32-36).

The total amount of herbicide used by this project will undoubtedly be a tiny fraction of total herbicide used in the counties and around urban areas within and surrounding the Forest over the life of the project. For reference, in 2012 Inyo County used pesticides and herbicides on approximately 11,700 acres (<http://www.pesticideinfo.org/DCo.jsp?cok=14>). The majority of treatments would occur in Inyo and Mono Counties. Both Glyphosate and Triclopyr are sold over the counter and used extensively in

home and commercial landscaping, golf and park maintenance, and other similar applications nationwide. Such uses occur throughout and adjacent to the Forest and have not led to identifiable risks to water quality, as evidenced by water bodies adjacent to the Forest not being on the State 303(d) list of impaired water bodies.

As an example of a mobile herbicide, according to the SERA (2004) report, “clopyralid does not bind tightly to soil and thus would seem to have a high potential for leaching. While there is little doubt that clopyralid will leach under conditions that favor leaching – sandy soil, a sparse microbial population, and high rainfall – the potential for leaching or runoff is functionally reduced by the relatively rapid degradation of clopyralid in soil. A number of field lysimeter studies and a long-term field study indicate that leaching and subsequent contamination of ground water is likely to be minimal. “This conclusion is also consistent with a monitoring study of clopyralid in surface water after aerial application” (SERA 2004). BMPs were also designed to minimize the risk of leaching. This includes not applying clopyralid when soils are saturated and monitoring weather forecasts prior to application. Leaching is therefore unlikely to be a factor affecting water quality in this project.

Accidental spills are not considered within the scope of the project. Project design features would reduce the potential for spills to occur, and if an accident were to occur, minimizes the magnitude and intensity of impacts. An herbicide transportation and handling plan is a project requirement. This plan will address spill prevention. Approximately ½ gallon of concentrated herbicide will be transported at any one time, though more or less may be transported. Concentrations of herbicides in the water as a result of an accidental spill depend on the volume spilled and the stream ratio of surface area to volume. The persistence of the herbicide in water depends on the length of stream where the accidental spill took place, velocity of stream flow, and hydrologic characteristics of the stream channel. The concentration of herbicides would decrease rapidly downstream because of dilution and interactions with physical and biological properties of the stream system (Norton et al.2004).

4.1.2 Cumulative Effects

The use of the small amount of herbicides proposed in this project for currently known and future infestations would occur over a brief period of time and would not contribute to a cumulative degradation of water quality.

Cumulative Watershed Effects (CWE): A watershed cumulative impact can be defined as the total impact, positive or negative, on runoff, erosion, water yield, floods, and/or water quality that result from the incremental impact of a proposed action, when added to other past, present and reasonably foreseeable future actions occurring within the same natural drainage basin, or watershed Analysis of the proposed activities indicate that little if any cumulative effects would occur in any of the watersheds on the Forest. No watershed has more than 1.0 percent proposed for treatment and most have well under 0.1 percent chemical treatments within the project area. This amount is much too small an area to show measurable effects to flows from treatment. BMPs and integrated design features would also be in place to minimize impacts to riparian areas. Given application rates, methods, and likely number of acres to be treated annually, concentration of herbicides approaching levels of concern for

water quality is unlikely. Half-life period, solubility, or adsorption of each herbicide determines how readily each would transport off site. Because herbicides degrade, their half-life period impedes cumulative effects to water resources from multiple chemical treatments at a single site. The risk of cumulative effects to water quality from manual treatments of invasive plants is insignificant, even if all mapped acreage were treated by using this method, which would not occur.

Cumulative effects to water quality are not expected because of the following factors: the small, dispersed treatment sites, the minimal ground disturbance caused by removal of individual plants using manual/physical methods, the site-specific application of chemicals that degrade within a matter of days to months, the use of buffers along streams and hydrologic features with live water, and the implementation of relevant design criteria and BMPs. Many of the watersheds will not receive treatment during the project period. Only the land and roads within the National Forest System would be treated in the Proposed Alternative. The Forest, however, is intermingled with other Federal, state, county, and private ownerships. Management activities and actions on neighboring lands may contribute to the spread of invasive plants on NFS lands, and vice versa. However, with the suite of treatments proposed in this project the cumulative effects on NFS lands would be negligible; because, as new infestations occur, they would be treated effectively.

None of the treatments are extensive enough under this alternative to affect peak flows, low flows, or water yield. Methods used for treatment would have negligible effect on surface runoff. Approximately 45,846 acres are currently mapped as infested with invasive plants with an aggressive treatment strategy on approximately 1,489 acres currently (Priority 1 and 2 species, see proposed action). No watershed has more than 1.0 percent proposed for treatment and most have well under 0.1 percent. This amount is much too small an area to show any effects to water quality from treatment. Further, near water bodies, only concentrated areas of infestation be treated. Treatment would generally be discontinuous and limited at any specific site.

4.2 Alternative 2 – No Action

4.2.1 Direct and Indirect Effects

Under this alternative, the proposed action would not be implemented. Invasive plants would continue to grow and spread in sites where manual treatments have been ineffective, including riparian areas. Stream bank stabilization will be diminished as seed species replace deeper rooted native plants in certain areas. Stream shading will be diminished as native hardwoods and conifers are outcompeted by weeds in very localized areas. Herbicide would continue to be used by hand application only per the current Weed EA. There would be no direct or indirect effects to channel morphology, stream flow, or water quality from this alternative.

4.2.2 Cumulative Effects

No new invasive plant treatments would occur outside of ongoing manual treatments. Lack of effective treatments would allow the continued spread of invasive plants and the associated changes in

ecosystems. There may be a reduction in riparian vegetation diversity and reduced quality of aquatic habitat in localized situations.

5. References

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